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Original Research

Incremental impact of body mass status with modifiable unhealthy lifestyle behaviors on pharmaceutical expenditure

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Abstract

Background: Overweight/obesity is a growing health risk in Korea. The impact of overweight/obesity on pharmaceutical expenditure can be larger if individuals have multiple risk factors and multiple comorbidities. The current study estimated the combined effects of overweight/obesity and other unhealthy behaviors on pharmaceutical expenditure.

Methods: An instrumental variable quantile regression model was estimated using Korea Health Panel Study data. The current study extracted data from 3 waves (2009, 2010, and 2011).

Results: The final sample included 7148 person-year observations for adults aged 20 years or older. Overweight/obese individuals had higher pharmaceutical expenditure than their non-obese counterparts only at the upper quantiles of the conditional distribution of pharmaceutical expenditure (by 119% at the 90th quantile and 115% at the 95th). The current study found a stronger association at the upper quantiles among men (152%, 144%, and 150% at the 75th, 90th, and 95th quantiles, respectively) than among women (152%, 150%, and 148% at the 75th, 90th, and 95th quantiles, respectively). The association at the upper quantiles was stronger when combined with moderate to heavy drinking and no regular physical check-up, particularly among males.

Conclusion: The current study confirms that the association of overweight/obesity with modifiable unhealthy behaviors on pharmaceutical expenditure is larger than with overweight/obesity alone. Assessing the effect of overweight/obesity with lifestyle risk factors can help target groups for public health intervention programs.

Keywords: Overweight/obesity; Pharmaceutical expenditure; Instrumental variable quantile regression model; Unhealthy behavior

Conflict of interest: All authors declare that they have no conflict of interest.

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Introduction

Obesity is a global public health concern, given that obesity prevalence has more than doubled since 1980. Of adults worldwide aged 18 years and older, 39% are obese and 13% are overweight in 2014.[1] Korea has a similar public health problem, with 31.7% of adults being overweight or obese in 2007, up from 26.0% in 1998.[2] Obesity is a risk factor for many illnesses, and thus it is not surprising that obese people are likely to use more health care services and have higher health expenditure than their non-obese counterparts.[3–10] Obese people consume a disproportionate share of health care resources.[11,12] Large health care expenditures attributable to overweight or obesity (OW/OB) are also reported in Korea.[13,14]

Medication is a key factor in managing diseases, particularly chronic diseases, although individual health behaviors and other health care services are important as well.[15] Pharmaceutical expenses are even more important in Korea, where 29% of total health expenditure in the National Health Insurance Service (NHIS) is pharmaceutical spending and the annual increase in pharmaceutical spending for the past decade has been much higher than the increase in total health expenditure.[16]

However, except for the work of Cawley and Meyerhoefer,[17] previous studies have estimated the association only at the mean of pharmaceutical expenditure, without addressing potential heterogeneity across the entire conditional distribution of the pharmaceutical expenditure. For example, obesity may impose a greater burden to pharmaceutical expenditure for those with higher drug expenses. If obesity is associated with pharmaceutical expenditure only at the bottom or top of the distribution of expenditure, mean estimation using ordinary least squares (OLS) can mask or underestimate potential statistical significance at the ends of the distribution.[2]

The impact of OW/OB on pharmaceutical expenditure can be larger if individuals have multiple risk factors and multiple comorbidities.[18] For example, the effect of obesity on health expenditure is reported to increase when obesity is combined with physical inactivity.[19–23] However, few studies have estimated the association of obesity with pharmaceutical expenditure when lifestyle risk factors other than physical inactivity simultaneously exist with obesity. A study by Alter et al[24] is one exception, and they reported that obesity was not statistically significantly associated with health care costs when it is a sole risk factor, whereas obesity in combination with other lifestyle risk factors such as smoking, physical inactivity, and/or social distress was associated with significantly higher health care cost.

The current study estimates whether and how much obesity incrementally affects pharmaceutical expenditure when combined with other modifiable unhealthy lifestyle behaviors. A quantile regression model was used to explore the direction, magnitude, and statistical significance of the association of OW/OB with pharmaceutical expenditure when OW/OB co-existed with other modifiable lifestyle risk factors across the entire distribution of pharmaceutical expenditures. An instrumental variable (IV) approach was used to estimate the causal relationship of OW/OB with pharmaceutical expenditure. Assessing the comprehensive impact of OW/OB with concomitant lifestyle risk factors can be useful for targeting groups for public intervention programs.

Methods

Data

The current study used data from the Korea Health Panel Study, a nationally representative annual panel survey started in 2009. It has a vast amount of information on health, health service use, and expenditure, as well as standard demographic and socioeconomic information at both the household and individual levels. The merit of this survey is that it extracts health service use and health expenditure (including pharmaceutical expenditure) information from NHIS, the sole public health insurer in Korea, with almost all Koreans included as compulsory beneficiaries. The survey sample is based on a two-stage stratified cluster sampling. Regional clusters were randomly sampled and households in the sampled clusters were systematically sampled. Approximately 350 clusters were sampled and approximately 8000 households in those clusters were surveyed in every wave. In each survey round, additional households were sampled to make up for attrition.[24]

The current study extracted data from 3 waves (2009, 2010, and 2011). The final sample for the current study included 7148 person-year observations for adults aged 20 years or older after dropping observations with missing information for any variables used in the estimation.